Name _____

Cellular Respiration Reading Guide

1. Photosynthesis is a chemical pathway to build sugars where cellular respiration is a chemical pathway to break-down (decomposition) sugars. Explain the implications of both with regard to energy available for living things.
2. There are two broad sequences of respiration pathways, briefly describe the similarities and differences of both.
3. Briefly describe the logic supporting a gradual oxidation of glucose in the energy conversion pathway of cellular respiration.
4. Name the three stages of chemical reactions involved in aerobic respiration.
5. Please note, glycolysis itself is an anaerobic process as it does not utilize oxygen. Also, please note that this is a pre-cursor to both aerobic an anaerobic respiration. With this said, and without itemizing each step in the pathway, identify the molecules that are needed for glycolysis and the molecules that are produced.
6. Pay close attention to page 135, "At the end of glycolysis. . ." This is the fork in the road of the aerobic and anaerobic pathways. If oxygen is not sufficiently present in animal and some bacteria cells, what becomes of the pyruvate product of glycolysis? In other bacteria and yeast (our fermentation lab) what becomes of the pyruvate product of glycolysis?
7. Pay close attention to figure 5.7 on page 136, if oxygen is sufficiently present, what becomes of the pyruvate product of glycolysis?
8. Diagram the anatomy of the mitochondria and identify similarities between its structure and that of the chloroplast.
9. In the presence of oxygen, and once the pyruvate molecules are transported to the mitochondria a sequence of reactions called the Krebs Cycle occurs. Identify the "big picture" with regard to the Krebs Cycle making a summary statement of what occurs and what is produced in this sequence of reactions (again, do not itemize each metabolic step, study the text description and figure 5.10 and focus on what is needed and what is produced)
10. The good news, you can apply you understanding of the electron transport chain in chloroplasts to that in the mitochondria almost completely with some subtle modifications:

    What are cytochromes?
    What coenzymes are responsible for delivering electrons to the ETC and where/when did they become reduced?

    Chemiosmosis results in ATP production in the mitochondria as was the case in photosynthesis, again, subtle differences, on which side of the inner membrane do hydrogen ions become concentrated? What serves as the final electron acceptor at the end of the electron transport chain(think of the analogy of the open door at the bottom of the steps in a fire drill)? Please take time to carefully study Appendix 4A to compare chemiosmosis in chloroplasts and mitochondria?

11.What is meant by the description facultative aerobes, obligate anaerobes, obligate aerobes?
12.Study table 5.3 account for the total number of molecules of ATP that can be formed via aerobic respiration versus the number that can be produced anaerobically.
13.Carefully read the “Focus On” section on page 143, summarize what is occurring in the respiration pathways during exercise and why we tend to fatigue.